ATTACHMENT A
Remarks

Claims 19-39 are pending in the present application. By this Amendment, Applicants have amended claims 19, 21, 28 and 39. Applicants respectfully submit that the present application is in condition for allowance and respectfully request that the Examiner reconsider the rejections and find the present application in condition for allowance based on the discussion which follows.

As an initial point, Applicants respectfully submit that this Amendment After Final should be entered, as the amendments to the claims do not require more than a cursory review by the Examiner to consider, in accordance with M.P.E.P. § 714.13. The claims have already been examined and art applied, based on how the claims are amended. Specifically, art relating to a computer method of image processing has been applied. Further, as discussed below, the present claim amendments were necessitated by recent changes in USPTO computer implemented method guidelines for subject matter under 35 U.S.C. § 101. However, since art relating to a computer implemented method has already been applied, no more than a cursory review is needed to examine the claims as now amended. Therefore, in accordance with M.P.E.P. § 714.13, this Amendment After Final should be entered.

Claims 19, 28 and 38 were rejected under 35 U.S.C. § 112, first paragraph, as allegedly failing to comply with the written description requirement. The Examiner alleges that the specification does not define the phrase "training dataset" and, therefore, is considered new matter.

Contrary to the rejection, Applicants respectfully submit that the present specification fully supports the recited "training dataset," as claimed. Applicants

respectfully direct the Examiner to the present specification, paragraph 4 of page 5, and paragraph 2 of page 6, which both refer to the learning of a model through the use of "training data." In addition, the term "dataset" is used in relation to images which are employed during the learning (i.e. training) process:

> ...a model is learnt using all images in a dataset (lines 2 and 3 of paragraph 3, page 9)
>
> ...whereby a user selects, say, 10 or so images from the dataset...and a model is learnt using these selected images (lines 5 and 6 of paragraph 3, page 9)
>
> The goal is to find the parameters ... which best explain the data ... from the chosen training images (be it 10 or the whole dataset)... (lines 1 to 4 of paragraph 4, page 9)
>
> ...there is an attempt to learn a model from a dataset which contains valid data ... A set of images sufficient to train a model (10, in this case) is randomly sampled from the images retrieved during a database search. (Paragraph 3 of page 10).

In the context of the claimed invention and the present specification, the term "dataset" is sufficiently defined within the specification as meaning a set of images from which a model is learnt or trained to thereby generate a model comprising parameters common among images in the training dataset. Accordingly, Applicants respectfully submit that claims 19, 28 and 38 are in full compliance with the requirements of 35 U.S.C. § 112, first paragraph, and the claims do not constitute new matter with regard to the phrase "training dataset." Therefore, Applicants respectfully request that the rejection to claims 19, 28 and 38 under 35 U.S.C. § 112, first paragraph, be withdrawn.

Claims 19, 28 and 38 were rejected under 35 U.S.C. § 112, second paragraph, as allegedly failing to include several steps before the recited identification step.

Contrary to the rejection, Applicants respectfully submit that claims 19, 28 and 38 are in full compliance with the requirements of 35 U.S.C. § 112, second paragraph, as there are no essential steps omitted in the recited invention prior to the claimed identification step. Applicants respectfully submit that the claimed identification step does not require any prior step. Applicants respectfully direct the Examiner's attention to the recited subject matter of claim 19, which relates to a method of transforming a predetermined visual object category to a model and, as such, clearly does not require any additional steps prior to the identification step, as the model is created on the basis of the training dataset already provided.

Indeed, the only action which is performed prior to the identification step is the production/selection of the image dataset used within the identification step. However, the set of images may be selected from a database in many different ways. For example, they might be manually selected by an operator, or may be automatically generated as the results produced by a search engine (see paragraph 5 of page 2 of the present specification). Hence, there is nothing new or inventive as to the production of a set of images from a database, and this step does not form part of the invention *per se*. Thus, the claimed invention 'starts' with the identification step.

Based on the foregoing, Applicants respectfully request that the rejection to claims 19, 28 and 38 under 35 U.S.C. § 112, second paragraph, be withdrawn.

Claim 21 was rejected 35 U.S.C. § 112, second paragraph, as allegedly being indefinite, asserting that pronouns are not permitted in a claim. By this Amendment, Applicants have amended claim 21 to replace the pronoun "its" with the corresponding

noun to which it refers, thereby obviating the rejection to claim 21. Applicants respectfully request that the rejection to claim 21 be withdrawn.

Claims 19-39 were rejected under 35 U.S.C. § 101, as allegedly not being directed to statutory subject matter, alleging that independent claims 19, 28 and 38 merely claim nonfunctional descriptive material, i.e. abstract ideas.

Contrary to the rejection of the claims, Applicants respectfully submit that claims 19-39 recite subject matter in full compliance with 35 U.S.C. § 101. The claims are directed to producing a useful concrete and tangible result, in accordance with current U.S. claim practice.

Referring to claim 19, for example, the useful result is the generation of a computer model which comprises model parameters. This result is both concrete and tangible in that it is reproducible and exists for more than a transitory period of time. Applicants respectfully direct the Examiner's attention to the interim guidelines for subject matter patentability to which Applicants respectfully submit that the claimed subject matter is in full compliance. See, e.g., M.P.E.P. § 2106, subject matter eligibility. In addition, as amended, claim 28 is now more clearly directed to determining the relevance of a set of images in an electronic database. Further, claim 38 is directed to an apparatus which comprises a processor performing the claimed function. Accordingly, Applicants respectfully request that the 35 U.S.C. § 101 rejection to the claims be withdrawn.

Claims 19-39 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Mojsilovic et al. (U.S. Patent No. 7,043,474) (hereinafter "Mojsilovic") in view of

Jain et al. (U.S. Patent No. 5,913,205) (hereinafter "Jain"), further in view of Essafi et al. (U.S. Patent No. 6,642,929) (hereinafter "Essafi").

Claims 19-39 were added in the last Amendment to replace previous claims 1-18, which were rejected using the same prior art and same assertions of the Examiner. Based on applying the previously cited prior art to the subject matter claimed and statements made in the Response to Arguments section of the final Office Action of May 13, 2008, Applicants respectfully submit the following remarks, which Applicants provide to further clarify what is claimed, as well as what the present subject matter, per the specification, discloses. The intention is to correct any misunderstanding of the present invention, as well as any misunderstanding as to the disclosure of the cited prior art.

The present invention is directed to studying a plurality of images (i.e. images of a training dataset) in order to identify common features among those images so that the images can be categorized (i.e. to create a visual object category model which collectively describes the images in the training dataset). In other words, the present method examines a plurality of images, identifies common features among those images, and then assigns the images a visual object category model.

For example, the present method, per claim 19, may proceed as follows. A plurality of images of an object, e.g., various apples, can be provided in a training dataset. The method proceeds by identifying one or more predetermined features within each apple image. Next, the features are classified in terms of descriptive variables. Subsequently, model parameters are estimated by identifying a set of parameters that best defines the descriptive variables from all of the apple images in the

training dataset to generate a computer model which comprises the model parameters. As a result, the model generated includes parameters common to all apples in the training dataset.

In sharp contrast to the present method, which is directed to learning (i.e. identifying) common features in a training dataset to generate a model, i.e. the visual object category model, Mojsilovic's method does exactly the opposite. Specifically, Mojsilovic takes a single sample (i.e. query) image and attempts to locate other images within a database that are like the sample (query) image. To this end, Mojsilovic measures (determines) image similarity in order to identify images in a database which are similar to the sample image. Mojsilovic starts with <u>a single sample image</u>, breaks the sample image down into a plurality of semantic categories, and then searches a database of images for those semantic cues to match the database image which is similar to the sample image.

Referring back to the prior example using a sample image of an apple, the Mojsilovic method would take the image of an apple, break it down into semantic cues, and then use those cues to query a database, looking for other images which have the same semantic cues, and then select images within that database that correspond with those semantic cues, thus returning images of <u>other apples</u> from the database.

It will be readily apparent to one of ordinary skill in the art that the present method and the Mojsilovic method are <u>completely different methods</u>. On one hand, in the present method, a series of steps are used to learn (i.e. determine) a visual object category model which corresponds to (i.e. represents) the single query object/image, thus a learning process occurs in which a plurality of images in a database are analyzed

in order to categorize the similarities among the images as a single category model which represents the query object/image. Mojsilovic, on the other hand, starts with a single image, breaks that single image down into a plurality of categories, and then identifies similar images within a database, which images have similar characteristics to that of the query image, and then selects images in the database which are similar to the query image.

Referring now specifically to the subject matter recited in claim 19, the above-identified method is broken down into three discrete steps comprising identifying one or more features present in a plurality of images in a training dataset. Again, referring back to the apple example, the training dataset would comprise a plurality of different apples. From the plurality of images in this training dataset of apples, one or more features within each image is identified.

Next, those features are classified in terms of descriptive variables, defining one or more characteristics of the feature in a spatial relationship therebetween. Finally, model parameters are estimated by identifying a set of parameters that best defines the descriptive variables from all of the images in the training dataset to thereby generate a model comprising the model parameters. In other words, those features which are common in all the images are used to generate a model, which in this example are features common to the query apple, which necessarily are present in all of the plurality of images in the training dataset.

The present method produces a result, i.e. a model, by analyzing a plurality of images within a training dataset, and finds common features among all images in that training dataset in order to generate a model. As a result, it will be clear to one of

ordinary skill in the art that the present method, comprising the three recited steps, learns what common features are present among all images in the training dataset, which is what allows the method to produce a model comprising model parameters, where these parameters are common to all images in the training dataset of images.

While the present invention involves modeling both object categories, in that the result of the present method is the generation of a model, it will be clear to one of ordinary skill in the art that the model generated by the presently claimed method is unique and in no way anticipated by or obvious in view of the cited prior art. As noted above, the invention provides a method for deriving a category model via employment of a learning technique and algorithms, as claimed and further exemplified in the present specification, page 5, paragraph 4 and page 9, paragraph 3. The salient features of the category are identified via the use of feature detectors, such as those exemplary ones disclosed on pages 6 and 7 of the specification as filed.

As will be clear to one skilled in the art, in contrast to the present model generated, Mojsilovic, paragraph 54, page 5 states "the ... system and methods provide for the semantic categorization and retrieval of photographic images based on low-level image descriptors derived preferably from perceptual experiments performed with human observers. In the method multidimensional scaling and hierarchical clustering are used to model the semantic categories into which human observers organise images. Through a series of psychological experiments and analyses, the definition of these semantic categories is refined, and the results are used to discover a set of the low-level image features to describe each category."

Moreover, it is clear that the present invention comprises a series of interrelated steps, generating various items, necessarily to be performed in a particular order/sequence, which in no way functions similarly to Mojsilovic. For example, Mojsilovic states that "having thus identified a set of semantic categories that human observers reliably use to organise images ... a next step models these categories such that they can be used operationally in an image retrieval or browsing application. Unlike conventionally approaches that use low-level visual primitives (such as color, color layout, texture and shape) to represent information about semantic meaning, the method focuses instead on the higher-level descriptors provided by human observers."

Based on the discussion of Mojsilovic, above, it is clear that its method is completely different from the present method.

Further, Applicants respectfully submit that it would not have been obvious for one of ordinary skill in the art to combine Mojsilovic with Jain or Essafi to arrive at the claimed method. First, as described above, Mojsilovic is a completely different method than the one claimed. Second, there fails to be any reasonably apparent reason why one of ordinary skill in the art would combine Mojsilovic with Jain or Essafi to arrive at the present method. Third, even if one were to combine the two references, the combination would fail to teach all claim elements, namely the generation of a model <u>from identifying characteristics within a plurality of images</u> in which the model comprises common features and parameters common among all images in the training dataset, as required by the invention, as claimed and discussed above.

As will be clear to one skilled in the art, even if one skilled in the art would combine the three cited prior art references, the three fail to teach or in any way make

obvious the claimed method which comprises a series of steps performed to generate a model, as claimed. Essafi and Jain are both directed to matching images to images. There is no learning of a category model as claimed in Essafi or Jain. As discussed above, Mojsilovic fails to teach learning of a category model, as claimed. Accordingly, the present invention is not obvious or anticipated in view of the three references.

Moreover, there fails to be any reasonably apparent reason why one skilled in the art would combine the three references as alleged by the Examiner. In order for references to be combined in an obviousness-type rejection, there must be some reasonably apparent reason which would have led one of ordinary skill in the art to select various elements from the individual references to arrive at the claimed invention. Such a reason may be a known problem identified in the art, a known problem to one of ordinary skill in the art, or a known benefit which would have resulted from combining the references and their individual elements in the manner as claimed. However, there fails to be any reason why one of ordinary skill in the art would have combined the three references, as alleged, to arrive at the claimed method. While the Examiner has provided conclusionary statements as to why one would combine the references, these statements are merely conclusionary and there fails to be any support or facts which would support such an assertion. In any event, it would not have been clear to one skilled in the art that selecting individual processing steps from three completely different methods and rearranging those in a particular manner would lead one to the present method, which generates a model which comprises features of a plurality of images, as claimed.

Furthermore, with regard to the Examiner's allegation that it would have been obvious to incorporate Essafi's teaching relating to modelling by using "probability," Applicants respectfully submit that the Examiner has misinterpreted the claimed estimating model parameters (e.g., as recited in claims 19 and 28). In view of statements made in the Office Action, it appears that the Examiner has focused on the word "probability" and "Gaussian" in Essafi and incorrectly used this evidence of "probability density functions" (points 12 and 16 of the Office Action) and "maximum likelihood" (Office Action point 15). However, referring to column 7, lines 56-59, Essafi is not using probability as a "probability density function." Instead, "probability" is being used in the generic English (i.e. non technical) sense of "more likely." In column 10, lines 63-65, Essafi is using 'Gaussian' in the sense of a waiting function, as any monotonically decreasing function would do. However, as discussed above, Essafi, like Jain, is a system for matching images to prior known images, not a method of learning a model category from a plurality of images.

Based on the foregoing, Applicants respectfully submit that the cited prior art, individually or in combination, fails to anticipate or make obvious the invention recited in independent claims 19, 28 and 38.

Furthermore, Applicants respectfully submit that the cited prior art fails to anticipate or make obvious the subject matter of dependent claims 20-27, 29-37 and 39, which depend from claims 19, 28 and 39, and further recite additional elements which are novel and in no way obvious in view of the cited prior art.

In addition, specifically with regard to the subject matter of claims 28 and 38, Applicants respectfully submit that the prior art, individually or in combination, fails to

teach or make obvious the recited calculating a likelihood value relating to each image based on its correspondence with said model by comparing said set of images with said computer model; and ranking said images in order of said respective likelihood values, to thereby determine the relevance of a set of images relative to a specified visual object category. Accordingly, claims 28 and 38, and dependent claims 29-39, are further not obvious in view of the cited prior art.

In view of the foregoing, Applicants respectfully submit that the present application is in condition for allowance.

END REMARKS